

longitudinally extended ferromagnetic cord members is distributed transversely. Independent claims 4 and 6 each recites a method of detecting and locating degradation of a rope comprising a body of non-ferromagnetic insulator material in which a plurality of longitudinally extended ferromagnetic cord members is distributed transversely. Each of these method relates to, inter alia, creating a partial magnetic circuit that runs from one of a pair of magnetic poles longitudinally through a portion of the cord members to the other pole, and monitoring, at a position between the poles along a longitudinal direction of the rope, magnetic flux emanating from the cord members out through the body of the rope and associated with the magnetic circuit.

Independent claim 10 recites an apparatus for detecting degradation of a rope comprising a rope body of non-ferromagnetic insulator material encasing at least one longitudinally extended ferromagnetic component. The apparatus includes, inter alia, a detector body comprising rope guide means, a magnet fixed with respect to the body for creating a partial magnetic circuit that runs from one of a pair of magnetic poles longitudinally through a portion of the ferromagnetic component to the other pole, and magnetic flux sensing means mounted with respect to the detector body at a position between the poles for monitoring magnetic flux emanating from the ferromagnetic component out through the rope body and associated with the magnetic circuit.

The cited art, even if combined in the asserted manner, does not disclose or suggest each feature recited in independent claims 1, 4, 6 or 10.

Verone discloses a cable failure detection system that detects changes in the magnetic field of a cable that has been magnetized. Although Verone illustrates a magnetic sensing device located between two magnets, that arrangement is provided so that, regardless of the direction of cable movement, the portion of the moving cable that passes through the magnetic sensing area is first magnetized by *one of* the magnets. As stated at column 3, lines 37-41 of Verone:

Magnetic sensing device 12 is capable of sensing in either direction and accordingly it enables the positioning of a second magnet 10a on the opposite side of the magnetic sensing device's first magnet 10 for bi-directional scanning.

Additionally, as can be seen in Figure 1 of Verone, each of the magnets 10, 10a has both a positive and a negative pole.

Thus, Verone fails to disclose or suggest at least the claimed feature relating to creating a partial magnetic circuit that runs from one of a pair of magnetic poles longitudinally through a portion of the ferromagnetic component to the other pole, and monitoring at a position between the poles the emanating magnetic flux associated with the magnetic circuit.

Sasahara et al., which is cited for its teachings regarding flaw detection in ferromagnetic members imbedded in non-magnetic insulator material (FRP), discloses monitoring magnetic properties to determine stress levels in the imbedded magnetic members (which levels apparently decrease due to internal damage to the surrounding FRP). The document discloses that exciting coils (supplied with high-frequency current) induce a magnetic flux through the FRP member, and detecting coils sense a resultant electromotive force (detected as a mutual inductance or as a wave distortion factor of alternating current). Therefore, although Sasahara et al. discloses inducing magnetic flux through the FRP, it does not disclose or suggest the claimed features regarding monitoring at a position between the poles the emanating magnetic flux associated with the magnetic circuit, and thus does not overcome the above-noted deficiency relative to the subject claims in the teachings of Verone.

Therefore, whether considered individually or in combination, the cited art fails to disclose or suggest salient features recited in claims 1, 4, 6 and 10.

Further, there would have been no objective reason to combine the teachings of Verone and Sasahara et al. in the asserted manner. Verone, which relates to cable failure/fault detection, relies on moving a portion of the cable from a magnet to the

magnetic sensing device in order to first magnetize and then make measurements on the portion of cable. Sasahara et al., on the other hand, relates to measuring changes in magnetic properties due to reduced *stress levels* in (not damage to) imbedded magnetic members, and appears to require that the exciting coils and detecting coils be held stationary relative to the FRP member being tested. Absent the teachings of Applicant's disclosure, there would have been no objective reason to refer to such disparate teachings in such disparate fields.

Thus, independent claims 1, 4, 6 and 10 are submitted to be allowable over the art.

The dependent claims, which are submitted to be allowable for the same reasons, also include features in addition to those recited in their respective base claims. Further independent consideration of the dependent claims is requested.

Claim 5

Claim 5 stands rejected under § 103(a) as allegedly being unpatentable over Melamud. This rejection is respectfully traversed, and reconsideration is requested.

Independent claim 5 recites a method for approximating tension-load bearing capacity of a rope comprising a body of non-ferromagnetic insulator material in which a plurality of longitudinally extended ferromagnetic cord members is distributed transversely. The method includes, inter alia, creating a partial magnetic circuit that runs from one of a pair of magnetic poles longitudinally through a portion of the cord members to the other magnetic pole, and measuring, at a position between the poles along a longitudinal direction of the rope, magnetic flux emanating from the cord members out through the body of the rope and associated with the magnetic circuit. The measured magnetic flux leakage is compared to predetermined data indicative of tension-load bearing capacity

Melamud et al., on the other hand, relates to measuring a phenomenon known as the Barkhausen effect. According to column 1, line 55-column 2, line 5 of Melamud et al.:

This effect consists of the large number of irreversible jumps in magnetization that occur while a ferromagnetic material is subjected to a varying magnetic field. The jumps are due to the unpinning of domain wall structures from defects and impurities in the material. As the applied field increases, a wall breaks away from one pinning site and moves rapidly until stopped by another pinning site. The resultant jumps in magnetization, which have the characteristic of a noise signal, can be detected by suitable sensors Since the pinning sites of the domain walls, i.e., dislocations and impurities, also affect the mechanical properties of the steel, it is possible to correlate the Barkhausen signal with the mechanical properties of metals.

Thus, since the Barkhausen effect is a completely different phenomenon than magnetic flux leakage, Melamud et al. fails to disclose or suggest such claimed features as measuring magnetic flux emanating from the cord members out through the body of the rope and associated with the magnetic circuit, and comparing the measured magnetic flux leakage to predetermined data indicative of tension-load bearing capacity.

Therefore, whether considered individually or in combination, the cited art fails to disclose or suggest salient features recited in claim 5. Thus, claim 5 is submitted to be allowable over the art.

Claim 32

Claim 32 stands rejected under § 103(a) as allegedly being unpatentable over Melamud. This rejection is respectfully traversed, and reconsideration is requested.

Claim 32 recites a monitoring system for monitoring the approximate load-bearing capacity of an elevator rope having a plurality of longitudinally-extended load-bearing elements that support the tension loads of the elevator system and a jacket that encompasses the load-bearing elements. The monitoring system includes excitation means for exciting the load-bearing elements in a manner such that the jacket is not subject to excitation, and monitoring means for monitoring the level of excitation of each of the load-bearing elements. The levels of excitation are correlated with the approximate load-bearing capacity of the elevator rope.

The Office Action indicates that it is considered an obvious design choice to test cord members in insulator material as claimed. However, as amended, claim 32 recites that a plurality of the load-bearing members are encompassed by the jacket and are excited and monitored. On the other hand, each apparatus disclosed in Melamud is mounted around the tested cable. It would not have been obvious to apply such an apparatus to an elevator rope having a plurality of encompassed load-bearing members, because the apparatus could not be mounted around each load-bearing member.

Therefore, whether considered individually or in combination, the cited art fails to disclose or suggest salient features recited in claim 32. Thus, claim 32 is submitted to be allowable over the art.

The application is submitted to be in condition for allowance, and Applicants request an early notice thereon.

Please charge any deficiency in fees associated with filing this response to our Deposit Account No. 15-0750, Order No. OT-4465.

Respectfully submitted,

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